Ballistic Protection for Expeditionary Shelters

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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Report Documentation Page

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Shelter Protection

- **Living, working, eating in tents and mobile shelters**
- **Protection Needed**
  - Entry Operation
  - On the move
- **Mission Oriented –** quick and seamless integration

Traditional Protection

- **Semi-Permanent Hardening**
- **Sandbags, concrete barriers, Hesco bastion**
- **Strengths:**
  - Robust
  - Defensive against multiple threats
- **Weaknesses:**
  - Labor intensive (sandbags/Hescos)
  - Require significant transportation assets(concrete)
  - Requires material handling equipment (concrete/Hescos)
  - Very low mobility once deployed (all)

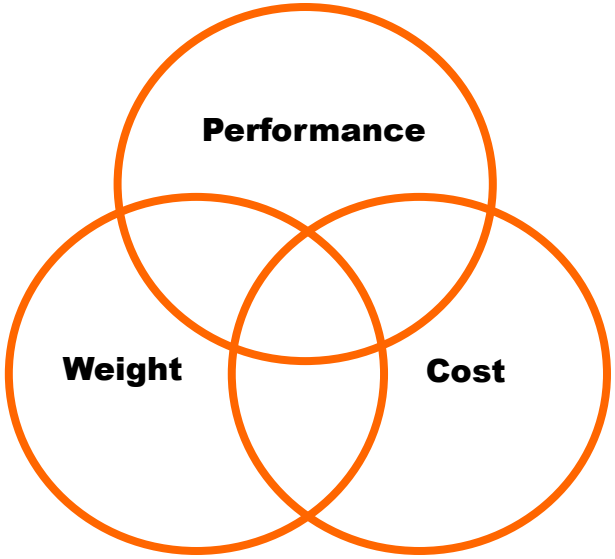
Modular Ballistic Protection System (MBPS) - Objectives

- Provides fragmentation protection
- Withstands blast pressures
- Rapidly deployed
- Man-portable and reusable
- Integrates with standard mobile shelters
- MBPS: not direct replacement for permanent, long term forms of force protection.





Program Challenges



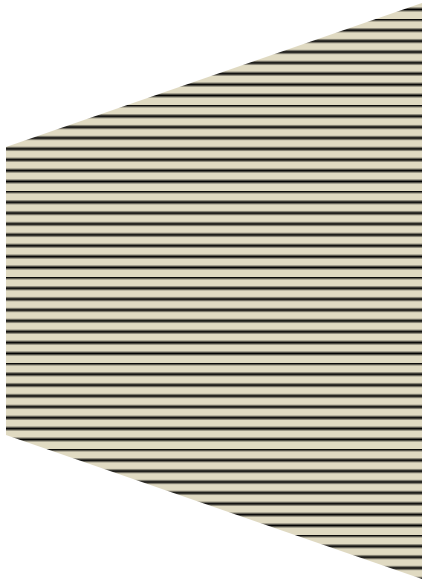
- **Tradeoff**
  - Tent camp - large surface area
  - Armoring low cost item

Setting the Requirements

Developing a new capability

- Expeditionary shelter protection - new
- Design team developed specifications

Shelter Mission



Variables to Consider

- Level of Protection
- Weight (lbs)
- Cube
- Set up time
- Signature
- Compatibility with existing systems
- No Special Tools
- Flexibility of Use
- Cost

Setting the Requirements

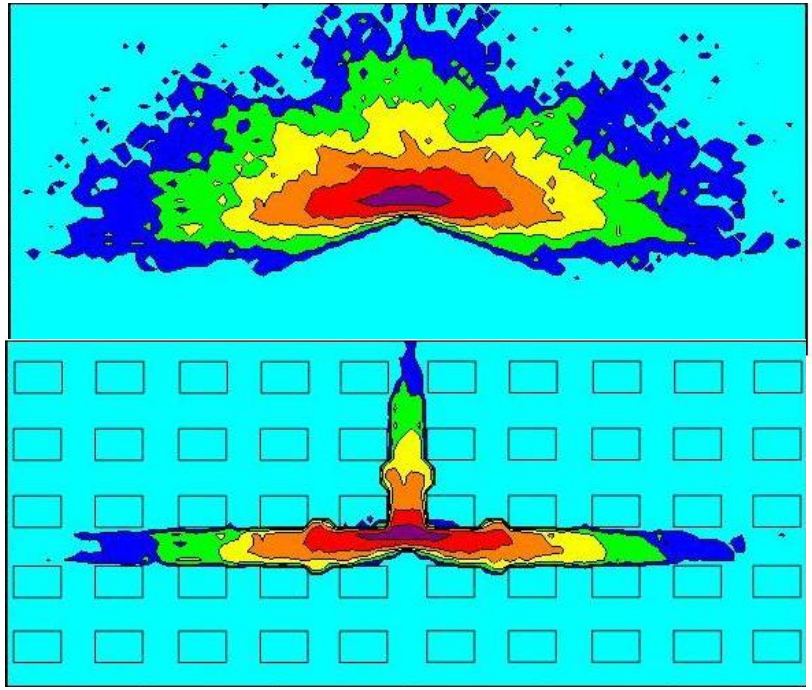
- **Ballistic Requirement**
  - Fragmentation – in theater threats
- **Blast Requirement**
  - Withstand blast in accordance with *Unified Facilities Criteria*
- **Live Munitions Requirement**
  - Perform satisfactorily against live munitions
- **Performance**
  - Transportability: track and wheeled vehicles, aircraft, helicopters
  - Deployment / Strike times: 4 soldiers/30 minutes
  - Extreme climate
  - Durability
  - Snow and wind loading
  - Fire
  - Off-gassing

Testing

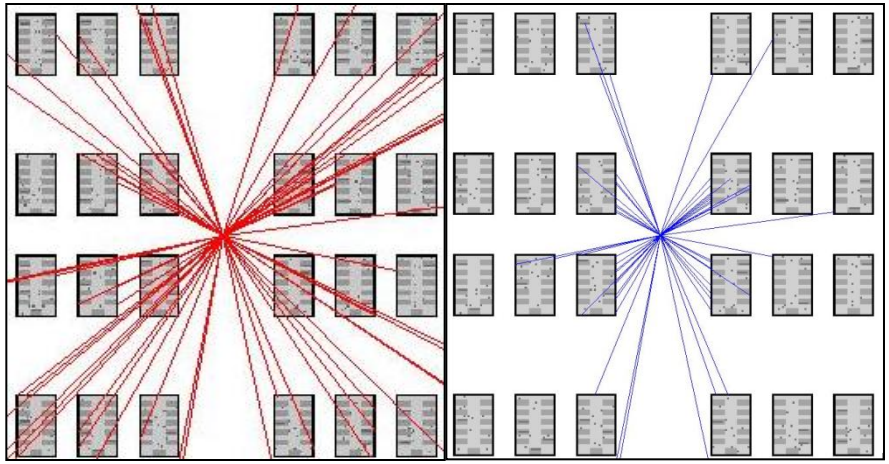
- **Ballistic**
- **Blast Overpressure**
- **Arena Testing**
- **User Evaluation**
- **Developmental Testing**
  - Durability / deployment times (20 cycles)
  - Transportability
  - High and low temperature
  - Snow and wind loading
- **Flame**

Preliminary Modeling

- **NSRDEC's Integrated Casualty Estimation Methodology (ICEM)**
  - Fragment based analysis
  - Determines the severity of injury both without and with the armor system in place



- **University of Maine Fragment Penetration Model**
  - Tracks the path of a number of fragments from a threat based on fragment speed/weight/trajectory
  - These fragments are determined to either stop on an armor panel or penetrate

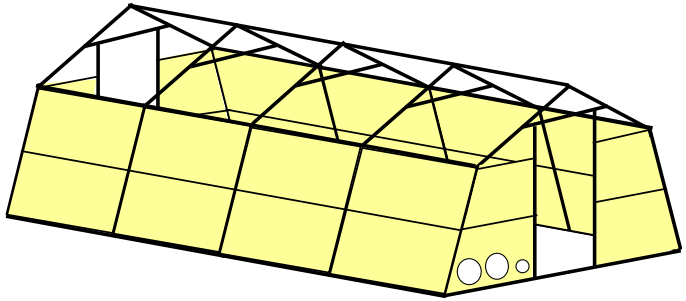


Applications/Status

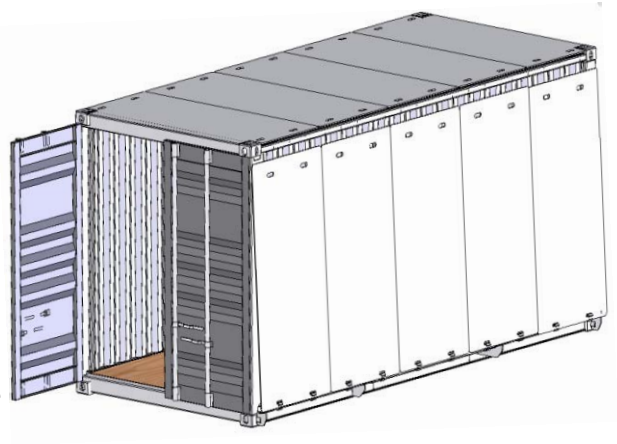
MBPS TEMPER:

- **Integrated onto TEMPER tent**
  - TEMPER: widely used standard tent
  - Simple strap connect/disconnect
  - Sliding endwall door

- **Completed all testing**
- **In theater field evaluation**



MBPS – Rigid Wall



- Containers used in theater for living space
- Integrates directly on CONEX containers with ISO corners
- Rail and ratchet attachment system
- Completed Developmental Testing, ATEC
- Completed User Evaluation August 09 Engineer Battalion, Ft McCoy
- In theater evaluation

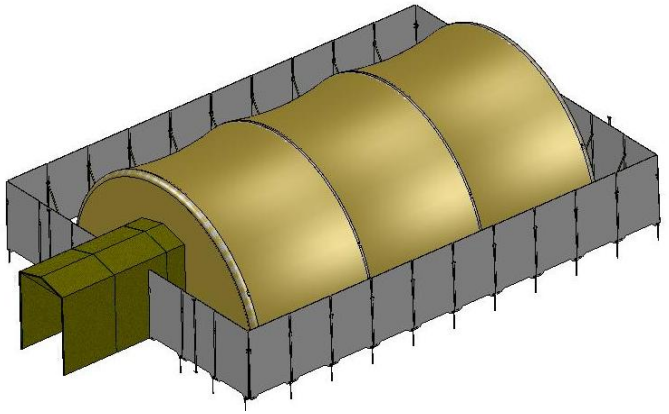
Application/Status

Mobile Kitchens

- Muddy Boots Council
- Prototype Designed for Containerized Kitchen (CK) and Modular Kitchen Trailer (MKT)
- Used existing panel design
- Preliminary Blast Test – May ‘09
- Structural FEA
- Redesign and test

Application/Status

- **MBPS Airbeam**
  - Force Provider tent camps transitioning to airbeam shelter systems
  - Airbeam unique response to blast loading
    - Dynamic response
  - Stand alone design being considered
  - Second blast test Nov 09



Partnerships

- **Product Manager, Force Sustainment Systems**
  - Materiel Developer and Total Life Cycle Manager for MBPS
  - Manages Formal Development Program and Transition Items to Field
- **University of Maine – AEWC Center (Orono, ME)** ***Congressional***
  - Development Partners of MBPS
  - Panel design, system designs, ballistic and blast modeling, manufacturing, testing
- **KaZaK Composites, Inc. (Woburn, MA)** ***Congressional***
  - Panels for rigid-walled design
  - Pultrusion manufacturing
- **Texas Research Institute Austin (Austin, TX)** ***SBIR***
  - High performance panels research

Partnerships (cont.)

- **Army Corps of Engineers**
  - Munitions expertise
  - Blast resistance and blast testing techniques
- **Air Force Research Lab (AFRL)**
  - Blast and fragmentation testing
- **Army Research Lab (ARL)**
  - Fragmentation Response Modeling
  - Ballistic Material Expertise
- **NSRDEC – WARPAD Directorate**
  - Ballistic protection and blast resistance
  - Ballistic performance modeling

Ongoing efforts

- **Panel improvements:**
  - Weight / Cost / Performance
- **Manufacturability:**
  - Reduce cost, increase production rates
- **Design refinements:**
  - Continuously upgrades
  - SBIR for flexible ballistic material
- **Technology transition:**
  - Through PM, FSS : Entered formal Army Acquisition process: Milestone A – 1QFY10
  - Rapid Equipping Force (REF) support – accelerated testing
  - Force Provider Capability Production Document – ballistic kit

Accomplishments

- **Successful partnerships with academia, industry, and military groups**
- **Adapted initial design for multiple shelter platforms**
- **Rapid transition from conceptual design to field-ready prototype**
- **All development accomplished with congressional and SBIR funding**


Questions?